

Sorption and Transport Properties of Small Gas Molecules in Thermally Rearranged Polymeric Membranes

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Gas transport behaviors through the membrane can be related with physical properties of membranes and gas molecules. According to the solution-diffusion mechanism, gas permeability of membranes is related to gas solubility coefficient with membranes and diffusivity coefficient through membranes. The diffusivity coefficient is defined as how fast the gases can pass through membranes, and the solubility coefficient is the affinity between gases and membrane materials. Recently, we have developed a highly permeable membrane material which is called thermally rearranged (TR) polymers. TR-polymers, which are aromatic polymers with heterocyclic rings, have been reported to exhibit excellent gas separation performances. To elucidate gas permeation properties, solution-diffusion mechanism was introduced and solubility coefficient from sorption behavior were studied by high pressure sorption method with small gas molecules of interest such as H₂, CO₂, O₂, N₂, etc.